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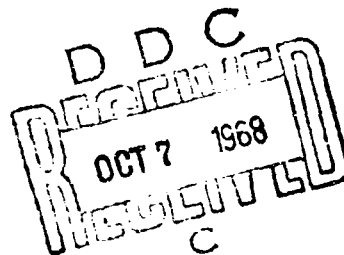
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EVALUATION OF SELECTED VARIETIES OF SOME CEREALS UNDER CONDITIONS OF THE CORN REGION

Vedecke Prace, Vyskumnae Ustava
Rastlinoj Vyroby v Piestanoch
(Scientific Works of Crop Produc-
tion Research Institute, Piestany)
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Introduction

Grains comprise the principal group of crops in crop production. They are the basis of the population's food supply, and the most valuable feed for livestock. At the same time, they are also an important industrial raw material. One of the most important and effective means of systematically increasing the grain harvest is to suitably select the composition of the sown assortment, and to zone the varieties. The particular significance of zoning is that in every farm region only the most productive varieties are introduced for cultivation, with due consideration for the local climatic, soil and production conditions -- i.e., varieties that are able to maximally utilize the given cultivation conditions so as to attain constant and high yields. () Sound zoning, however, requires reliable and objective data that are obtained in performance tests. Accordingly, one of the possibilities of directly utilizing the studied varieties within the world assortment is the performance testing of selected varieties that were the most promising in the basic tests.

Review of Literature

The worldwide professional literature devoted to the problems of grain is extensive. It sums up all available knowledge not only on the taxonomy, biology and utilization of grains, but also the detailed studies on the possibilities of maximally utilizing the bred new varieties, under certain pedological and climatic conditions. Since space limitations do not allow us to analyze the investigated problem in detail, we will cite

the works of only a few authors, with special attention to the varieties under study. Yakubtsiner (1964) discusses the intensive varieties of winter wheat and their utilization. Lelley et al (1963) analyze the problems of wheats and their utilization. Popov et al (1963) investigated the feasibility of growing southern types of wheat under the conditions in the Soviet Union. Rabinovich (1963) analyzes the problems of growing the wheat varieties of the Danube regions. Kostecki (1963) evaluates Polish and foreign wheat varieties, under the conditions in Poland. Lantev (1963) discusses the Scandinavian wheats and their utilization. Kapas (1961) evaluates the feasibility of growing Soviet wheat varieties under the conditions in Hungary. Rabinovich (1963) evaluates the wheat varieties of East Germany. Exceptional attention is being devoted to some wheat varieties, because of the results that have been attained in their cultivation. Thus the Soviet Bezostaya 1 variety is held in high esteem by many authors; for example, by Zhlutenko (1961), Kulpoi (1962), Kuchumov (1961), Yakubtsiner (1962), Tyricheva (1963), Gorbatyuk (1963), and others. The same is true of the Mironovskaya 803 and 264 varieties, which produced outstanding yields in comparison tests. These varieties are evaluated by Remeslo (1962), Prutskova (1964), and others. Interesting results of international comparison tests are given by Darpatov (1962) who evaluates the promising new wheat varieties. An important part of the tests and of their evaluation are also the values of the technological properties. Exceptional attention is being devoted to these properties, as evident from the works of Boldea et al (1963), Waltl (1962), Betz and Wuschek (1962), Samolevskiy (1962), Hooser (1962), Hyza (1959), Prugar (1964), and others.

The situation is the same with respect to the study and evaluation of the varieties of spring barley, which likewise is receiving considerable attention in the world literature. Bakhteyev (1955) speaks of barley as an important food and industrial crop. Aufhammer (1958) analyzes the quality of brewer's barley in various countries of Europe. Plumet (1955) studies the extracted substances and proteins. Szilvinyi and Payer (1955) investigate the qualitative indicators of brewer's barley. Moes (1955) discusses the varieties of spring barley. Gopp (1963) analyzes the problems of growing barley in various countries of Europe. Cans (1962) establishes grades for the properties and values of barley. Aufhammer (1962) considers an increase in the barley acreage.

In Czechoslovakia, considerable attention is being devoted to the problem of zoning. From 1956 to 1964, the Crop Production Research Institute in Piestany devoted much effort to the evaluation of grains, on the basis of the world assortment, and also of special experiments with selected varieties that proved promising in the basic tests. Reports on this work were published by Sestrienka and Polerecky (1961), Riman and Churova (1962), Riman (1962), Riman (1963 a + b), Riman and Foltin (1963), Riman and Bartos (1963), Riman (1964 a + b + c), Foltin and Riman (1964), Pastorek and Churova (1965), Riman (1965 a + b), and Riman and Foltin (1965). The listed authors analyze in detail the entire problem under study, and also the results attained during this period.

Material and Methods

After researching and studying for several years the world's grain assortment, we selected for the tests certain varieties which proved promising in the basic studies and evaluations, or which could be assumed to be suitable for the corn region, on the basis of the data published in the literature. The actual tests evaluated in this work covered in all 285 grain varieties, including 166 varieties of winter wheat, 96 varieties of spring barley, and 23 varieties of spring wheat. The tests were made on the plots of the Crop Production Research Institute in Piestany, Trnava Okres; of the Krakovany Cooperative Farm, Trnava Okres; and of the Nový Trh Experimental Farm, Dunajská Streda Okres. The general rules for comparison tests were observed. Increased doses of artificial fertilizer were used per hectare: for wheat, 20 + 20 kg N, 54 kg P_2O_5 , and 100 kg K_2O ; for spring barley, 30 kg N, 54 kg P_2O_5 and 60 kg K_2O . For control we used the varieties that have been zoned for the corn region. These were: the Kosutska variety in the case of winter wheat; the Slovensky Dunajsky trh (SDT) variety in the case of spring barley; and the Niva variety in the case of spring wheat. The results of the tests were processed statistically and evaluated by the analysis of variance method due to Hruby and Konvicka (1954). The results were analyzed in terms of the grain and straw values, and of the technological (intrinsic) properties, in accordance with the nature of the test material. The analyses of malting values were made in close cooperation with the Experimental Malting Station of the Slovak Malthouses, Trnava. The technological properties of wheat were evaluated in the closest possible cooperation with the Plant Breeding Station, Solary. The tests were performed in 1961-1964.

Experimental Part

The scope of the tests and studies is considerable. Because of space restrictions, we cannot report all the tests and their results. Therefore, we will limit ourselves to some of the interesting tests and will evaluate the results of the winter-wheat and spring-barley tests on the plots of the Crop Production Research Institute, Piestany.

The weather in the 1961-1962 growing season was favorable for winter wheat, only a relative drought delayed sowing. In March the weather was fairly cold, and in June there was little precipitation. But essentially this did not affect the development of the plants of the individual varieties, because the weather in winter was favorable for winter wheat. Table 1 presents the results of the tests in terms of yield. From an analysis of the variances we obtained the following values. For the grain yield: varietal difference $P = 0.05 = 7.2$ quintals (= 9.07 percent); varietal difference $P = 0.01 = 9.7$ q (= 12.37 percent). For the straw yield: varietal difference $P = 0.05 = 4.50$ q (= 8.36 percent); varietal

difference $P = 0.01 = 6.03 \text{ q}$ ($= 11.88$ percent). In Table 2 we present the technological analyses of the basic values of the grain yields in the performed tests. From the presented data it is evident that the investigated varieties did not have significantly higher values than the control (Kosut-ska variety).

The weather during the 1962-1963 growing season was exceptionally unsuitable for winter wheat, because the autumn was dry, and winter arrived unevenly, with temperature fluctuations. This produced frequent black frosts and glazed frosts, which damaged the crops and caused heavy losses to the national economy. For research and plant breeding, however, this disaster was exceptionally advantageous, because in this way the varieties could be tested from the viewpoint of their winter hardiness, etc. In other words, it was possible to study the complex of conditions which might occur when growing wheat in the corn region, and which are important from the viewpoint of evaluating the suitability of the individual varieties for zoning. In this respect the southern (especially Italian) varieties proved unsuitable for our corn region. Table 3 presents the results of the yield tests. From an analysis of the variances we obtained the following results. Grain: varietal difference $P = 0.05 = 4.16 \text{ q}$ ($= 4.9$ percent); varietal difference $P = 0.01 = 5.54 \text{ q}$ ($= 6.7$ percent). Straw: varietal difference $P = 0.05 = 6.17 \text{ q}$ ($= 11.20$ percent); varietal difference $P = 0.01 = 8.26 \text{ q}$ ($= 14.98$ percent). In Table 4 we present the technological analyses of the basic values of the grain yield from the performed tests. That year and the next, we were unable to do extensigraphic tests, because the instrument was out of order. The Mironovskaya 808, Bezostaya 1, and Fertodi 293 varieties proved very suitable in terms of technological properties. In view of the exceptional winter, we present also the stalk density per square meter. This count clearly illustrates the ability of the varieties to tolerate the extreme weather conditions of the corn region. From the presented results it is also evident that many varieties (1--8) had significant grain yields, in quintals per hectare. In the tests for straw, however, fewer varieties (1--5) showed significant results.

In the 1963-1964 growing season, the weather was average for winter wheat, except that in winter the temperature fluctuated. (But this did not affect the well-established crop as greatly as the preceding year.) The relative paucity of precipitation in winter, and also in summer, influenced to some extent the development of the plants. Table 5 presents the results of the yield tests. In the analysis of the variances we obtained the following results. Grain: varietal difference $P = 0.05 = 3.65 \text{ q}$ ($= 7.39$ percent); varietal difference $P = 0.01 = 4.83 \text{ q}$ ($= 10.32$ percent). Straw: varietal difference $P = 0.05 = 6.02 \text{ q}$ ($= 6.04$ percent); varietal difference $P = 0.01 = 7.96 \text{ q}$ ($= 9.18$ percent). In Table 6 we present the technological analysis of the basic values of the grain in the performed tests. From the presented results it is evident that the varieties ranking from 1 to 16 are significantly better than the control in terms of grain yield, but the control has not been surpassed in terms of straw yield.

Table 1
Experiments with Winter Wheat (1961-1962 Growing Season)

(a) Cult.	(b) variety	Grain		Straw		N	Grain		Straw		N	(e) Percent	(f) Percent
		N	(d) N v %	N	(e) N v %		N	(d) N v %	N	(e) N v %			
1	Svalof Panzer III (Sweden)(g)	48.27	80.69	10	95.88	95.88	91.79	91.79	1	1			
2	Weintraube Ergo (Sweden)(h)	42.45	70.06	12	102.05	102.05	95.40	95.40	1	1			
3	Hahnenschauer Qualitas (Germany)	65.71	101.16	2	89.39	89.39	83.31	83.31	1	1			
4	Prince VII (Germany)	57.86	96.72	4	81.99	81.99	78.11	78.11	10	10			
5	Molnártha Ulysses (Poland)(1)	57.91	95.51	5	91.22	91.22	90.72	90.72	5	5			
6	Belorusskaya 108 (USSR)	65.30	91.37	6	99.69	99.69	87.93	87.93	6	6			
7	Bezostaya 1 (USSR)(j)	63.61	103.12	1	78.19	78.19	71.55	71.55	11	11			
8	ICAR 558 B (Romania)	51.97	86.52	5	87.38	87.38	83.83	83.83	8	8			
9	San Pedro de Fav. 11 (Tallinn)(k)	45.36	75.65	11	69.00	69.00	57.11	57.11	12	12			
10	Albaca 22 (France)(1)	48.06	89.23	9	99.29	99.29	95.56	95.56	3	3			
11	Pavla 10000 (France)(1)	61.19	85.55	8	85.79	85.79	81.71	81.71	9	9			
12	Kuštánska (Czechoslovakia) (USSR)	69.82	106.69	3	101.45	101.45	100.00	100.00	1	1			
S	Primo-tel body	53.16	70.96	106.12	1	12	89.19	89.19	57.11	57.11			1 12

Key: a - number; b - variety; c - grain; d - \bar{x} in percent; e - rank; f - straw; g - Sweden; h - Germany; i - Poland; j - Rumania; k - Italy; l - France; 6 - Belotserkovskaya 198 (USSR); 7 - Bezostaya 1 (USSR); 12 - Kosutska (control) (Czechoslovakia); S - average values.

Technological Analyses of Winter Wheat

(a)	(b)	Leppek				
		(d)	(e)	(f)	(g)	(h)
1	Pozsar 141 (Svédsko) (t)	25	8	nepružn.	dobr.	(13) (17) (20)
2	Wentzils 20 (Svédsko)	32	5	nepružn.	dobr.	(21)
3	Holmer-Johner Qualitas (Nemsko)	20	11	pružn.	st. dobr.	(14) (18) (12)
4	Holmer VII (Nemsko) (u)	27	10	nepružn.	dobr.	slab.
5	Milgróatka Udyeka (Polsko) (v)	28	9	pružn.	st. dobr.	(23)
6	Belotsekovskaja (SSSR)	35	2	pružn.	st. dobr.	dobr.
7	Bezostaya 1 (SSSR)	30	7	pružn.	st. dobr.	dobr.
8	ICAR 378 B (Rumunsko) (w)	35	1	pružn.	st. dobr.	dobr.
9	San Pastore Fann. 14 (Taliansko) (x)	33	4	nepružn.	dobr.	slab.
10	Alonso 22 (Francúzsko) (y)	34	3	nepružn.	dobr.	slab.
11	Pavlo Dvupros (Francúzsko)	32	6	nepružn.	dobr.	slab.
12	Krásnicka (ČSSR) (z)	22	12	siln.	(16) v. krát.	(19) dobr.
5	Průměrná hodnota	29,01	1-12	—	—	—

Key to Table 2: a - number; b - variety; c - gluten; d - moist gluten, percent; e - rank; f - elasticity; g - extensibility; h - gluten grade; i - swelling value; j - extensigraph; k - area under curve, cm²; l - corrected, cm²; m - category; n - farinograph; o - absorption, percent; p - drop-off after 10 minutes; q - drop-off after 15 minutes; r - drop-off area, cm²; s - number; t - Sweden; u - Germany; v - Poland; w - Rumania; x - Italy; y - France; z - Czechoslovakia; S - average values;

6 - Belotsekovskaya (USSR); 7 - Bezostaya 1 (USSR); 13 - slightly elastic; 14 - elastic; 15 - inelastic; 16 - strong;

(1961-1962 Growing Season)

Table 2

(j)					(n)					
(i)	(e)	(k)	(l)	(m)	(o)	(p)	(q)	(r)	(s)	(m)
6	7	33.3	33.3	B2	60,—	120	130	21.2	31.5	C1
7	9	18.2	18.8	C1	58,—	125	115	21.5	33.7	C1
13	2	33.1	31.3	B1	50,—	90	120	11.5	33.8	B2
5	8	19.8	18.8	C1	51,—	100	200	23.7	23.5	C2
10	6	32.1	29.2	B1	57,—	100	130	16,—	47.1	B2
12	5	33.7	32.5	B1	60,—	60	110	12,—	31.5	B2 B1
13	3	39.6	36.1	A2, B1	60,—	65	100	9.7	58.7	B1
11	5	47.1	33.6	A2, B1	60,—	60	110	10.5	35,—	B1
1	12	17.5	19.4	C1	60,—	200	210	57.2	10.5	C2
2	10	19.3	20.8	C1	60,—	130	150	23.8	34.5	C1
2	11	15.8	21.4	C1	50,—	150	180	33.5	21.2	C2
20	1	15,—	32.1	B1, A2	56,—	40	105	8.3	62.0	B1
8,33	1—12	29.27	26.51	—	58.33	108.33	145.83	26.30	41.42	—

17 - extensible; 18 - intermediately extensible; 19 - very briefly; 20 - poorish; 21 - poor; 22 - good; 23 - intermediate.

Table 3

Experiments with Winter Wheat (1962-1963 Growing Season)

(a) №	Odstava (b)	Počet mletin po průměrnosti (c)		\bar{x} % (d)		\bar{x} % (e)		\bar{x} % (f)		\bar{x} % (g)		(h)
		\bar{x}	\bar{x} %	(e) mletin	(d)	(e) mletin	(f)	(g)	(h)	(i)	(j)	
1	Hana (Světlá) (b)	106,16	136,39	12	31,15	12	82,02	101,20	10	10	10	10
2	Skandin 111 B (Světlá)	125,15	163,39	10	27,99	10	73,65	126,33	10	10	10	10
3	Reale (Světlá)	83,33	165,06	13	37,05	13	97,30	109,03	13	13	13	13
4	Yron (Fru) (Nemetská) (j)	64,52	82,90	16	23,78	16	62,37	98,12	16	16	16	16
5	Hodunské Quilias (Nem.)	60,50	71,73	18	31,96	18	81,03	93,29	18	18	18	18
6	Hana VIII (Nemetská)	61,67	79,37	17	26,64	17	70,10	71,47	17	17	17	17
7	Hana VIII (Nemetská) (j)	57,67	73,38	19	20,06	19	70,10	102,00	19	19	19	19
8	Hana VIII (Nemetská) (j)	117,68	189,71	4	41,57	4	111,65	102,00	4	4	4	4
9	Malgoska Udyka (Polská) (k)	138,33	177,58	5	41,88	5	118,10	102,00	5	5	5	5
10	Fertiz 293 (Maďarská) (l)	23,33	42,98	20	13,58	20	33,73	31,29	20	20	20	20
11	Bezostaja 1 (4,5 mil.) (SSSR) (n)	122,17	156,97	11	38,52	11	100,57	91,28	11	11	11	11
12	Bezostaja 1 (4,5 mil.) (SSSR) (n)	153,33	225,26	11	38,52	11	100,57	91,28	11	11	11	11
13	Bezostaja 1 (4,5 mil.) (SSSR) (n)	167,83	215,63	2	46,37	2	122,07	102,00	2	2	2	2
14	Kuntsevskaja 45 (SSSR) (j)	127,83	161,27	9	39,10	9	102,80	102,00	9	9	9	9
15	Mironovskaja 204 (SSSR) (j)	133,83	171,95	7	45,75	7	120,39	102,00	7	7	7	7
16	Mironovskaja 808 (SSSR) (j)	106,83	214,35	3	60,86	3	133,81	102,00	3	3	3	3
17	Tavricheskaja (SSSR) (j)	131,33	172,59	6	40,72	6	107,15	102,00	6	6	6	6
18	Savann 6111 (Polská) (j)	62,67	106,22	11	40,55	11	102,00	102,00	11	11	11	11
19	Favone (Tatarská) (o)	6,83	8,78	21	4,83	21	102,00	102,00	21	21	21	21
20	Mara (Tatarská) (o)	1,16	1,49	22	4,83	22	102,00	102,00	22	22	22	22
21	Kvčichá ostěná (SSSR) (p)	128,33	161,88	8	43,62	8	120,05	102,00	8	8	8	8
22	Kvčichá ostěná (SSSR) (p)	17,83	100,00	15	38,00	15	100,00	102,00	15	15	15	15
8	Průměrná hodnota	100,34	149,25,26	1,22	36,88	1,22	120,81	100,00	1,22	1,22	1,22	1,22

Key: a - number; b - variety; c - plant density after wintering; d - \bar{x} in percent; e - rank; f - grain; g - straw; h - Sweden; i - Germany; j - Austria; k - Poland; l - Hungary; m - France; n - USSR; o - Italy; p - Czechoslovakia; q - control; 11, 12 - Bezostaja; 13 - Cner-vonaya; 14 - Kuntsevskaja; 15, 16 - Mironovskaja; 17 Tavricheskaja; 18 - average value.

Table 5

Experiments with Winter Wheat (1963-1964 Growing Season)

Exp. (a)	Object (b)	X	S ² (d)	Var. (e)	S	N (d)	Var. (e)
1	Diana 1 (USSR) (g)	55.60	119.06	6.3	18.00	91.00	18
2	Diana 1 (USSR) (g)	52.60	117.03	10	17.00	88.00	10
3	Diana 1 (USSR) (g)	49.80	87.57	25	16.00	100.00	25
4	Diana 1 (USSR) (g)	42.10	99.11	27	15.00	82.00	27
5	Diana 1 (USSR) (g)	48.00	107.58	18	14.00	101.00	18
6	Diana 1 (USSR) (g)	50.20	108.14	11	13.00	90.00	11
7	Diana 1 (USSR) (g)	46.70	100.00	20	12.00	100.00	20
8	Diana 1 (USSR) (g)	50.30	107.49	16	11.00	97.00	16
9	Diana 1 (USSR) (g)	41.70	95.72	25	10.00	95.00	25
10	Diana 1 (USSR) (g)	41.30	94.86	19	9.00	92.00	19
11	Diana 1 (USSR) (g)	47.80	102.73	1	8.00	90.00	1
12	Diana 1 (USSR) (g)	60.20	128.01	2.3	7.00	70.00	2.3
13	Diana 1 (USSR) (g)	60.30	126.98	12	6.00	91.00	12
14	Diana 1 (USSR) (g)	61.30	109.23	17	5.00	87.00	17
15	Diana 1 (USSR) (g)	49.00	106.87	21	4.00	68.00	21
16	Diana 1 (USSR) (g)	46.50	99.37	4	3.00	96.00	4
17	Diana 1 (USSR) (g)	67.20	122.18	2.3	2.00	97.00	2.3
18	Diana 1 (USSR) (g)	60.30	126.98	11	1.00	100.00	11
19	Diana 1 (USSR) (g)	51.60	110.16	3	0.00	96.00	3
20	Diana 1 (USSR) (g)	56.60	121.29	13	0.00	97.00	13
21	Diana 1 (USSR) (g)	50.30	107.50	8	0.00	93.00	8
22	Diana 1 (USSR) (g)	53.70	111.69	13	0.00	93.00	13
23	Diana 1 (USSR) (g)	50.70	108.26	9	0.00	102.00	9
24	Diana 1 (USSR) (g)	52.80	113.06	6.7	0.00	82.00	6.7
25	Diana 1 (USSR) (g)	53.60	119.03	26	0.00	77.00	26
26	Diana 1 (USSR) (g)	41.70	94.65	23	0.00	87.00	23
27	Diana 1 (USSR) (g)	45.10	96.27	23	0.00	94.00	23
28	Diana 1 (USSR) (g)	46.30	99.57	23	0.00	95.00	23
S	Primerne body	50.20	87.37	128.91	1.28	60.20	128.91

Key: a - number; b - variety; c - grain; d - \bar{X} in percent; e - rank; f - straw; g - Czechoslovakia; h - control; i - USSR; j - Poland; k - Hungary; l - Austria; m - Germany; n - Sweden; S - average values; 11 - Belotserkovskaya; 12, 13 - Bezostaya; 14 - Chervonaya; 15 - Kuntsevskaya; 16 - Michurinka; 17, 18 - Mironovskaya; 19 - Tavricheskaya.

Technological Analyses of Winter Wheat

(a)	(b)	(c)				
		(d)	(e)	(f)	(g)	(h)
1	Polana (Svoboda) (t)	42	5	nepruž.	slab. (30)	slab. C1 (33)
2	Slavica 1 (t) (Svoboda)	42	8	nepruž.	slab. (32)	slab. C1 (34)
3	Slavica (Svoboda)	40	18	nepruž.	slab.	slab. C1
4	Eros (Přibor) (Německo) (u)	41,5	9	nepruž.	slab.	slab. C2
5	Indumersleben (Qualitas) (Něm. čis.)	42	20	slab. pruž.	slab. slab.	slab. C2
6	Hermes VII (Německo)	38	15	nepruž.	slab. slab.	slab. C1, C2
7	Hartachweizen (Rakúsko) (v)	42	6	slab. (28)	slab.	slab. C1 (36)
8	Maharadžka Poljska (Polsko) (w)	34	19	nepruž.	slab.	slab. C1
9	Periboli 266 (Maďarsko) (x)	42	7	slab. pruž. (27)	slab. slab.	slab. C1
10	Etoile du Loire (Francie) (y)	43	3	nepruž.	slab.	slab. C1, 2
11	Bezostaja 1 (4,5 mil.) (SSSR) (z)	38	16	pruž. (38)	slab. slab.	slab. C1 (37)
12	Bezostaja (6 mil.) (SSSR)	38	17	slab. pruž.	slab. slab.	slab. C1, 2
13	Červonaja (SSSR)	39	14	nepruž. (29)	slab.	slab. C1 (34)
14	Kumovskaja 45 (SSSR)	40	19	slab. pruž.	slab. slab.	slab. C1
15	Mironovskaja 261 (SSSR)	39	13	slab. pruž.	slab. slab.	slab. C1
16	Mironovskaja 308 (SSSR)	39	12	slab. pruž.	slab. slab.	slab. C1, 2
17	Tavričeskaja (SSSR)	43	4	nepruž.	slab.	slab. C1 (34)
18	Stomil 6111 (Rakúsko)	49	1	nepruž.	slab.	slab. C1
19	Furone (Itálie) (23)					
20	Mara (Itálie)					
21	Kušická ostená (kontrola) (24) (ČSSR) (25)	46	2	nepruž.	slab. slab.	slab. C2 (33)
22	Košická (kontrola) (ČSSR)	39	11	slab. pruž.	slab. slab.	slab. C1, 2
8	Průměrné hodnoty	40,1	1-20	---	---	---

Key to Table 4: a - number; b - variety; c - gluten; d - moist gluten, percent; e - rank; f - elasticity; g - extensibility; h - gluten grade; i - swelling value; j - extensigraph; k - area under curve, cm²; l - corrected, cm²; m - category; n - farinograph; o - absorption, percent; p - drop-off after 10 minutes; q - drop-off after 15 minutes; r - drop-off area, cm²; s - number; t - Sweden; u - Germany;

(1962-1963 Growing Season)

Table 4

(i)	(e)	(k)	(j)	(l)	(n)	(o)	(p)	(q)	(r)	(s)	(m)
11	11					105	100	100	100	100	C2
12	12					100	100	100	100	100	C1
13	13					100	100	100	100	100	C1
14	14					100	100	100	100	100	C2
15	15					100	100	100	100	100	C1
16	16					100	100	100	100	100	C2
17	17					100	100	100	100	100	C1
23	23					100	100	100	100	100	C1
24	24					100	100	100	100	100	C1
25	25					100	100	100	100	100	C1
26	26					100	100	100	100	100	C1
27	27					100	100	100	100	100	C1
28	28					100	100	100	100	100	C1
29	29					100	100	100	100	100	C1
30	30					100	100	100	100	100	C1
31	31					100	100	100	100	100	C1
32	32					100	100	100	100	100	C1
33	33					100	100	100	100	100	C1
34	34					100	100	100	100	100	C1
35	35					100	100	100	100	100	C1
36	36					100	100	100	100	100	C1
37	37					100	100	100	100	100	C1
38	38					100	100	100	100	100	C1
39	39					100	100	100	100	100	C1
40	40					100	100	100	100	100	C1
41	41					100	100	100	100	100	C1
42	42					100	100	100	100	100	C1
43	43					100	100	100	100	100	C1
44	44					100	100	100	100	100	C1
45	45					100	100	100	100	100	C1
46	46					100	100	100	100	100	C1
47	47					100	100	100	100	100	C1
48	48					100	100	100	100	100	C1
49	49					100	100	100	100	100	C1
50	50					100	100	100	100	100	C1
51	51					100	100	100	100	100	C1
52	52					100	100	100	100	100	C1
53	53					100	100	100	100	100	C1
54	54					100	100	100	100	100	C1
55	55					100	100	100	100	100	C1
56	56					100	100	100	100	100	C1
57	57					100	100	100	100	100	C1
58	58					100	100	100	100	100	C1
59	59					100	100	100	100	100	C1
60	60					100	100	100	100	100	C1
61	61					100	100	100	100	100	C1
62	62					100	100	100	100	100	C1
63	63					100	100	100	100	100	C1
64	64					100	100	100	100	100	C1
65	65					100	100	100	100	100	C1
66	66					100	100	100	100	100	C1
67	67					100	100	100	100	100	C1
68	68					100	100	100	100	100	C1
69	69					100	100	100	100	100	C1
70	70					100	100	100	100	100	C1
71	71					100	100	100	100	100	C1
72	72					100	100	100	100	100	C1
73	73					100	100	100	100	100	C1
74	74					100	100	100	100	100	C1
75	75					100	100	100	100	100	C1
76	76					100	100	100	100	100	C1
77	77					100	100	100	100	100	C1
78	78					100	100	100	100	100	C1
79	79					100	100	100	100	100	C1
80	80					100	100	100	100	100	C1
81	81					100	100	100	100	100	C1
82	82					100	100	100	100	100	C1
83	83					100	100	100	100	100	C1
84	84					100	100	100	100	100	C1
85	85					100	100	100	100	100	C1
86	86					100	100	100	100	100	C1
87	87					100	100	100	100	100	C1
88	88					100	100	100	100	100	C1
89	89					100	100	100	100	100	C1
90	90					100	100	100	100	100	C1
91	91					100	100	100	100	100	C1
92	92					100	100	100	100	100	C1
93	93					100	100	100	100	100	C1
94	94					100	100	100	100	100	C1
95	95					100	100	100	100	100	C1
96	96					100	100	100	100	100	C1
97	97					100	100	100	100	100	C1
98	98					100	100	100	100	100	C1
99	99					100	100	100	100	100	C1
100	100					100	100	100	100	100	C1

v - Austria; w - Poland; x - Hungary; y - France; z - USSR;
S - average values;

11, 12 - Bezostaya; 13 - Chervonaya; 14 - Kuntsevskaya; 15, 16 - Mironovskaya; 17 - Tavricheskaya; 23 - Italy; 24 - control; 25 - Czechoslovakia; 26 - inelastic; 27 - intermediate elasticity; 28 - poor; 29 - small; 30 - very extensible; 31 - intermediately extensible; 32 - extensible; 33 - bad; 34 - poor; 35 - intermediate; 36 - poorish; 37 - good; 38 - elastic.

Technological Analyses of Winter Wheat

(a)	(b)	(d)	(e)	(c)		
				(f)	(g)	(h)
1	Pravoslava (t)	28	27	(29)	(35)	(40)
2	Pravoslava (t)	28	28	(30)	(36)	(41)
3	Pravoslava (t)	29	2	pruž.	taž.	slabé C1
4	Chomutovská 12 (SSSR)	39	3	pruž.	str. taž.	slabé C1
5	Iva (SSSR)	39	4	str. (29)	str. taž.	slabé C2
6	Kostelecká (SSSR)	31	14	nepr. (31)	v. taž. (37)	slabé C2 (42)
7	Ivinská (SSSR)	32	22	pruž. (32)	str. taž. (38)	slabé C1 (43)
8	Pravoslava 108 (SSSR)	35	10	pruž.	taž.	slabé C1
9	Pravoslava 200 (SSSR)	30	5	str. pruž.	str. taž.	slabé C2
10	Sokol (SSSR)	42	1	pruž.	str. taž.	dobré A2 B1
11	Belovodskaja 108 (SSSR) (u)	38	6	pruž.	str. taž.	dobré B1 A2
12	Bezostej 1 (1,5 mil.) (SSSR)	32	25	v. pruž. (33)	str. (39)	dobré A2
13	Bezostej 1 (6 mil.) (SSSR)	31	25	v. pruž.	krát.	dobré A2
14	Červená (SSSR)	31	15	pruž.	str. taž.	dobré A2
15	Komarovská 45 (SSSR)	36	7	pruž.	str. taž.	dobré A2
16	Milutinka (SSSR)	33	18	str. (29)	str. (35)	slabé C2
17	Mironovská 201 (SSSR)	33	19	pruž.	str. taž.	dobré A2
18	Mironovská 308 (SSSR)	35	11	pruž.	str. taž.	dobré A2
19	Tavrišská (SSSR)	36	8	pruž.	str. taž.	dobré B1
20	Milgozanka Ulyoka (Polsko) (v)	36	9	pruž.	taž.	str. B2
21	Pestál 203 (Maďarsko) (w)	35	12	pruž.	str. taž.	dobré B1 A2
22	Hornetshweizen (Rakúsko) (x)	31	16	pruž.	taž.	slabé B2, C1
23	Stamm 6111 (Rakúsko)	33	20	v. kr. (34)	str. taž.	dobré B2
24	Hochmildebener Qualitas (Nemecko)	36	26	pruž.	taž.	slabé C2
25	Heino V11 (Nemecko)	32	24	nepr.	v. taž.	slabé C2
26	Djuna (Švédsko)	34	17	nepr.	v. taž.	slabé C2
27	Skandia 111 B (Švédsko) (y)	35	13	nepr.	v. taž.	slabé C2
28	Syano (Švédsko)	33	21	nepr.	v. taž.	slabé C2
S	Průměrné hodnoty	34,50	1-28	—	—	—

Key to Table 6: a - number; b - variety; c - gluten; d - moist gluten, percent; e - rank; f - elasticity; g - extensibility; h - gluten grade; i - swelling value; j - extensigraph; k - area under curve, cm²; l - corrected, cm²; m - category; n - farinograph; o - absorption, percent; p - drop-off after 10 minutes; q - drop-off after 15 minutes; r - drop-off area, cm²; s - number; t - Czechoslovakia; u - USSR; v - Poland; w - Hungary; x - Austria; y - Sweden; S - average values;

(1963-1964 Growing Season)

Table 6

		(j)				(n)		
		(k)	(l)	(m)	(o)	(p)	(q)	(r)
(i)	(e)							
11	1				58	100	128.5	15.85
12	12				58	100	128.5	15.85
13	13				58	100	128.5	15.85
14	14				58	100	128.5	15.85
15	15				58	100	128.5	15.85
16	16				58	100	128.5	15.85
17	17				58	100	128.5	15.85
18	18				58	100	128.5	15.85
19	19				58	100	128.5	15.85
20	20				58	100	128.5	15.85
21	21				58	100	128.5	15.85
22	22				58	100	128.5	15.85
23	23				58	100	128.5	15.85
24	24				58	100	128.5	15.85
25	25				58	100	128.5	15.85
26	26				58	100	128.5	15.85
27	27				58	100	128.5	15.85
28	28				58	100	128.5	15.85
29	29				58	100	128.5	15.85
30	30				58	100	128.5	15.85
31	31				58	100	128.5	15.85
32	32				58	100	128.5	15.85
33	33				58	100	128.5	15.85
34	34				58	100	128.5	15.85
35	35				58	100	128.5	15.85
36	36				58	100	128.5	15.85
37	37				58	100	128.5	15.85
38	38				58	100	128.5	15.85
39	39				58	100	128.5	15.85
40	40				58	100	128.5	15.85
41	41				58	100	128.5	15.85
42	42				58	100	128.5	15.85
43	43				58	100	128.5	15.85
44	44				58	100	128.5	15.85
45	45				58	100	128.5	15.85
46	46				58	100	128.5	15.85
47	47				58	100	128.5	15.85
48	48				58	100	128.5	15.85
49	49				58	100	128.5	15.85
50	50				58	100	128.5	15.85
51	51				58	100	128.5	15.85
52	52				58	100	128.5	15.85
53	53				58	100	128.5	15.85
54	54				58	100	128.5	15.85
55	55				58	100	128.5	15.85
56	56				58	100	128.5	15.85
57	57				58	100	128.5	15.85
58	58				58	100	128.5	15.85
59	59				58	100	128.5	15.85
60	60				58	100	128.5	15.85
61	61				58	100	128.5	15.85
62	62				58	100	128.5	15.85
63	63				58	100	128.5	15.85
64	64				58	100	128.5	15.85
65	65				58	100	128.5	15.85
66	66				58	100	128.5	15.85
67	67				58	100	128.5	15.85
68	68				58	100	128.5	15.85
69	69				58	100	128.5	15.85
70	70				58	100	128.5	15.85
71	71				58	100	128.5	15.85
72	72				58	100	128.5	15.85
73	73				58	100	128.5	15.85
74	74				58	100	128.5	15.85
75	75				58	100	128.5	15.85
76	76				58	100	128.5	15.85
77	77				58	100	128.5	15.85
78	78				58	100	128.5	15.85
79	79				58	100	128.5	15.85
80	80				58	100	128.5	15.85
81	81				58	100	128.5	15.85
82	82				58	100	128.5	15.85
83	83				58	100	128.5	15.85
84	84				58	100	128.5	15.85
85	85				58	100	128.5	15.85
86	86				58	100	128.5	15.85
87	87				58	100	128.5	15.85
88	88				58	100	128.5	15.85
89	89				58	100	128.5	15.85
90	90				58	100	128.5	15.85
91	91				58	100	128.5	15.85
92	92				58	100	128.5	15.85
93	93				58	100	128.5	15.85
94	94				58	100	128.5	15.85
95	95				58	100	128.5	15.85
96	96				58	100	128.5	15.85
97	97				58	100	128.5	15.85
98	98				58	100	128.5	15.85
99	99				58	100	128.5	15.85
100	100				58	100	128.5	15.85
101	101				58	100	128.5	15.85
102	102				58	100	128.5	15.85
103	103				58	100	128.5	15.85
104	104				58	100	128.5	15.85
105	105				58	100	128.5	15.85
106	106				58	100	128.5	15.85
107	107				58	100	128.5	15.85
108	108				58	100	128.5	15.85
109	109				58	100	128.5	15.85
110	110				58	100	128.5	15.85
111	111				58	100	128.5	15.85
112	112				58	100	128.5	15.85
113	113				58	100	128.5	15.85
114	114				58	100	128.5	15.85
115	115				58	100	128.5	15.85
116	116				58	100	128.5	15.85
117	117				58	100	128.5	15.85
118	118				58	100	128.5	15.85
119	119				58	100	128.5	15.85
120	120				58	100	128.5	15.85
121	121				58	100	128.5	15.85
122	122				58	100	128.5	15.85
123	123				58	100	128.5	15.85
124	124				58	100	128.5	15.85
125	125				58	100	128.5	15.85
126	126				58	100	128.5	15.85
127	127				58	100	128.5	15.85
128	128				58	100	128.5	15.85
129	129				58	100	128.5	15.85
130	130				58	100	128.5	15.85
131	131				58	100	128.5	15.85
132	132				58	100	128.5	15.85
133	133				58	100	128.5	15.85
134	134				58	100	128.5	15.85
135	135				58	100	128.5	15.85
136	136				58	100	128.5	15.85
137	137				58	100	128.5	15.85
138	138				58	100	128.5	15.85
139	139				58	100	128.5	15.85
140	140				58	100	128.5	15.85
141	141				58	100	128.5	15.85
142	142				58	100	128.5	15.85
143	143				58	100	128.5	15.85
144	144				58	100	128.5	15.85
145	145				58	100	128.5	15.85
146	146				58	100	128.5	15.85
147	147				58	100	128.5	15.85
148	148				58	100	128.5	15.85
149	149				58	100	128.5	15.85
150	150				58	100	128.5	15.85
151	151				58	100	128.5	15.85
152	152				58	100	128.5	15.85
153	153				58	100	128.5	15.85
154	154				58	100	128.5	15.85
155	155				58	100	128.5	15.85
156	156				58	100	128.5	15.85
157	157				58	100	128.5	15.85
158	158				58	100	128.5	15.85
159	159				58	100	128.5	15.85
160	160				58	100	128.5	15.85
161	161				58	100	128.5	15.85
162	162				58	100	128.5	15.85
163	163				58	100	128.5	15.85
164	164				58	100	128.5	15.85
165	165				58	100	128.5	15.85
166	166				58	100	128.5	15.85
167	167				58	100	128.5	15.85
168	168				58	100	128.5	15.85
169	169				58	100	128.5	15.85
170	170				58	100	128.5	15.85
171	171				58	100	128.5	15.85
172	172				58	100	128.5	15.85
173	173				58	100	128.5	15.85
174	174				58	100	128.5	15.85
175	175				58	100	128.5	15.85
176	176				58	100	128.5	15.85
177	177				58	100	128.5	15.85
178	178				58	100	128.5	15.85
179	179				58	100	128.5	15.85
180	180				58	100	128.5	15.85
181	181				58	100	128.5	15.85
182	182				58	100	128.5	15.85
183	183				58	100	128.5	15.85
184	184				58	100	128.5	15.85
185	185				58	100	128.5	15.85
186	186				58	100	128.5	15.85
187	187				58	100	128.5	15.85
188	188							

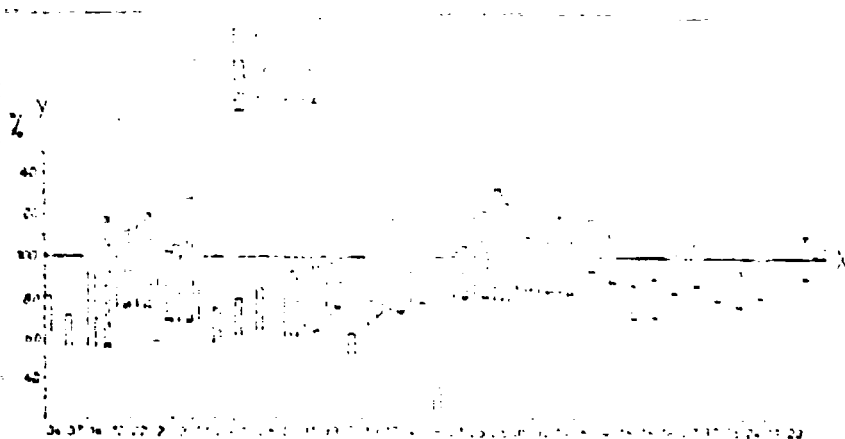


Fig. 1. Grain Yield of Winter Wheat in Piestany.

The y-axis shows the grain yield in percent; 100 percent is the grain yield of the control variety. The x-axis shows the varieties: 1 - Alsace; 2 - Belotserkovskaya; 3 - Bezostaya 1; 4 - Chervonaya; 5 - Diana; 6 - Diana I; 7 - Eros; 8 - Etoile de Choisy; 9 - Fanal; 10 - Fertodi 293; 11 - Funone; 12 - Hadmerslebener Qualitas; 13 - Harrachswitzen; 14 - Heines VII; 15 - Hodoninska ostena; 16 - Chlumecka 12; 17 - ICAR 578 B; 18 - Iva; 19 - Kasticka ostena; 20 - Kosutska; 21 - Kuntsevskaya 45; 22 - Malgozatka Udycka; 23 - Mara; 24 - Michurinka; 25 - Mironovskaya 264; 26 - Mironovskaya 808; 27 - Pavlovicka 198; 28 - Pevele D'espres; 29 - San Pastore fam. 14; 30 - Slovenska 200; 31 - Skandia III B; 32 - Stamm 6111; 33 - Svale; 34 - Svalofs Panzer III; 35 - Sal'ska; 36 - Tavricheskaya; 37 - Weibulls Ergo.

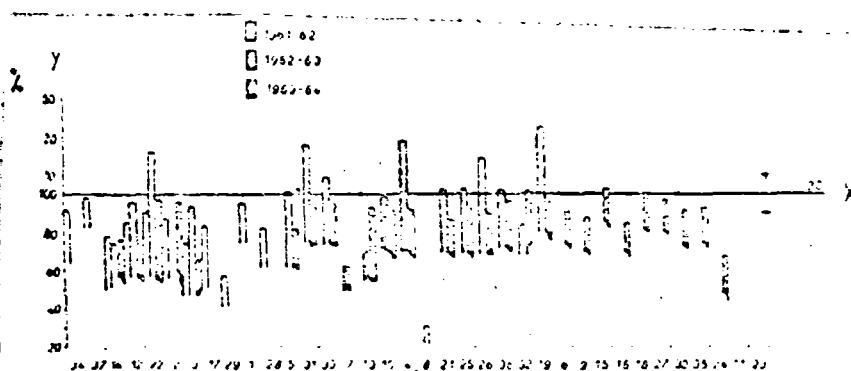


Fig. 2. Straw Yield of Winter Wheat in Piestany.

The y-axis shows the straw yield in percent; 100 percent is the straw yield of the control variety. The x-axis shows the varieties [1--37 as in Fig. 1, above].

Table 7

Experiments with Spring Barley (1962 Growing Season)

Exp. (a)	Variety (b)	Zinn (c)		Zinn (d)		Number (e)	Zinn (f)		P (g)
		N	N %	N	N %		N	N %	
1	Proctor (Austria) (g)	61.00	100.00	84.15	111.73	3	84.15	111.73	1
2	D. Ha (Holland) (h)	63.25	104.13	71.62	98.25	1	71.62	98.25	10
3	Gazelle (Holland) (i)	61.50	102.50	73.80	119.84	1	73.80	119.84	5
4	Carlsberg II (Denmark) (l)	62.16	102.20	73.10	117.59	9	73.10	117.59	6
5	Hafnia (Denmark)	62.56	102.56	72.15	115.33	8	72.15	115.33	11
6	Rajet (Denmark)	63.71	104.37	80.18	125.85	3	80.18	125.85	2
7	Brutus Wism (Netherlands) (j)	63.29	103.98	79.65	125.85	7	79.65	125.85	3
8	Farber's Union (Netherlands)	61.36	100.60	73.15	119.20	10	73.15	119.20	9
9	Lisa (Spain 11700) (Netherlands)	55.20	90.35	58.25	105.53	12	58.25	105.53	3
10	Violet II (Holland) (k)	60.25	98.78	68.28	113.33	11	68.28	113.33	12
11	Hjouschij 43 (USSR)	61.98	103.20	79.10	127.62	2	79.10	127.62	1
12	Shostakovich Danaj 15 1st (USSR) (m)	62.66	102.66	73.92	117.96	6	73.92	117.96	4
8	Experimental locality	62.61	101.28	70.13	111.85	1-12	70.13	111.85	1-12

Key: a - number; b - variety; c - grain; d - \bar{X} in percent; e - rank; f - strain; g - England; h - Holland; i - Denmark; j - Germany; k - Austria; l - Czechoslovakia; m - average values; 11 - Il'yinskii 43 (USSR).

Technological Analyses of Spring Barley

(a)	Označení (b)	(c)		(d)		(f)		(g)	
		Hmotnost, g	Hmotnost, g	2,5	3,2	(e)	Hmotnost, g	Hmotnost, g	
									(h)
1	Proctor, Anglicko (A)	71,1	91,5	0,5	1,2	40,5	5	50	
2	Osiba (Holandsko) (B)	71,5	98,1	0,5	1,1	41,0	6	50	
3	Chazella (Holandsko)	72,8	93,0	0,1	0,9	39,1	6	51	
4	Carlsberg 11 (Dánsko) (C)	69,7	90,0	0,0	1,0	41,7	10	58	
5	Holsten (Dánsko)	70,1	85,0	1,0	0,5	38,0	6	52	
6	Sejka (Dánsko)	65,3	70,0	10,0	13,1	38,1	8	50	
7	Pyrenus White (Německo) (D)	71,7	90,0	5,2	1,8	41,2	6	52	
8	Prifocks Union (Německo)	73,2	90,0	2,8	1,2	40,0	10	56	
9	Isar (SSSR 11705) (Německo)	72,0	91,2	8,0	0,8	40,2		100	
10	Vojkova 11 (Rakúsko) (E)	70,5	90,0	2,3	1,7	40,2	6	51	
11	Dijmaraj 43 (SSSR) (F)	73,0	100,0			40,4	4	54	
12	Slovenský Dvojnásobný tří — kontrola (SSSR)	72,8	96,0	3,0	1,0	40,9	6	50	
S	Průměrné hodnoty	71,32	91,94	0,95	2,03	40,27	5,83	51,00	

Key to Table 8: a - number; b - variety; c - hectoliter weight; d - sifting, mesh size; e - waste; f - absolute dry weight; g - cut through endosperm; h - mealy; i - half-steely; j - steely; k - mealy in percent; l - moisture content, percent; m - chemical content of dry matter: n - nitrogen; o - proteins; p - starch; q - malt extract; r - yield; s - dry malt; t - dry extract; u - crop; v - dry matter in the grain, per hectare; w - dry extract per hectare; x - dry extract produced per hectare, in percent of the control; y - rank; A - England; B - Holland; C - Denmark; D - Germany; E - Austria; F - control (Czechoslovakia); S - average values; 11 - Il'yinetskiy 43 (USSR).

Table 8

(1962 Growing Season)

[illegible]

Technological Analyses of Spring Barley

(a)	(b)	(c)	(d) (f)			(g)	
			(e)	(h)	(i)	(j)	(k)
1	Pravosl. (A)	70.3	78.0	1.0	5.1	38.5	100
2	Pravosl. (A)	69.0	78.5	1.0	5.2	38.5	100
3	Pravosl. (B)	67.0	80.0	7.7	1.3	38.5	100
4	Carlberg 11 (C)	69.0	70.2	10.0	8.3	38.5	100
5	Carlberg 11 (C)	69.0	70.0	10.7	2.1	38.5	100
6	Carlberg 11 (C)	67.0	80.5	11.0	1.3	38.5	100
7	S. J. (D)	67.2	70.0	11.3	7.0	38.5	100
8	Meister (D)	70.8	84.0	11.3	3.2	38.5	100
9	Dana (D)	68.8	80.7	11.0	5.1	42.6	100
10	Brems. Wisk. (D)	70.8	80.7	10.7	5.1	37.9	100
11	Forbecks. Unica (D)	71.0	93.4	3.0	2.7	38.7	100
12	Chuvence 11 (E)	72.0	77.7	12.0	0.7	38.5	100
13	Vasa. Stom. 11705 (E)	71.0	85.2	5.0	0.9	42.6	100
14	Pima (E)	70.8	94.8	0.6	2.0	41.7	100
15	Violeta 11 (F)	70.8	81.0	10.2	3.8	41.9	100
16	Stom. 11-11 6-17 (F)	66.8	80.2	6.8	4.0	43.2	100
17	Stom. 11-11 6-18 (F)	70.4	80.0	4.9	4.2	41.5	100
18	Byneckij 13 (F)	71.0	80.5	10.5	0.0	38.2	100
19	Nosovitskiy 2 (F)	68.8	80.7	11.7	7.0	41.2	100
20	Stepovoy (F)	66.8	70.7	10.0	11.1	40.3	100
21	Umanskiy 2021 (F)	71.2	80.0	11.3	5.2	40.5	100
22	Dona (G)	70.0	80.0	5.4	4.5	41.1	100
23	Antick (H)	71.2	87.5	8.9	4.5	38.5	100
24	Ariel (I)	72.0	80.0	3.2	0.8	43.8	100
25	Slov. Dan. tri - kontr. (J)	71.0	80.0	7.7	1.3	38.5	100
S	Primerne hodnoty	69.00	84.50	10.50	5.29	40.82	100.00

Key to Table 10: a - number; b - variety; c - hectoliter weight; d - sifting, mesh size; e - waste; f - absolute dry weight; g - cut through endosperm; h - mealy; i - half-steely; j - steely; k - mealy in percent; l - moisture content, percent; m - chemical content of dry matter; n - nitrogen; o - protein; p - starch; q - malt extract; r - yield; s - dry malt; t - dry extract; u - crop; v - dry matter in the grain, per hectare; w - dry extract per hectare; x - dry extract produced per hectare, in percent of the control; y - rank;

A - England; B - Holland; C - Denmark; D - Germany; E - Austria; F - USSR; G - Norway; H - Poland; I - France; J - control (Czechoslovakia); S - average values;

18 - Il'yinetskiy; 19 - Nosovitskiy; 20 - Stepovoy; 21 - Umanskiy.

Table 10

19

Table 9

Experiments with Spring Barley (1963 Growing Season)

(a)	Variety (b)	Yield (c)			Straw (f)		
		X	\bar{X} (d)	Parallels (e)	X	\bar{X} (d)	Parallels (e)
1	Proctor (Anglo)	68.72	110.37	5	60.56	97.37	6
2	Rayston (Anglo)	57.16	108.37	7	57.08	96.09	18
3	Iskra (Holland)	53.78	100.15	15	52.14	83.15	22
4	Gazelle (Holland)	51.27	102.01	12	53.58	88.57	20
5	Carlberg 11 (Dansk)	51.56	99.91	20	47.83	97.82	6
6	Radnor (Dansk)	50.83	104.94	10	47.83	76.77	27
7	Scyth (Dansk)	50.88	111.61	4	49.83	79.11	21
8	Menton (Dansk)	51.41	121.07	1	61.45	95.91	5
9	Duna (Dansk)	56.15	106.16	9	57.91	97.28	17
10	Brune Wosa (Nemetsko)	55.80	99.34	18	64.27	97.28	17
11	Firback Union (Nemetsko)	59.77	112.31	3	58.68	93.51	15
12	Criewerper 11 (Nemetsko)	55.15	105.66	11	64.73	102.16	1
13	Liba (Stamm 1103) (Nemetsko)	53.52	96.81	21	58.20	93.16	17
14	Plena (Nemetsko)	54.96	101.17	13	67.38	107.71	21
15	Viola (Holland)	53.11	109.39	14	51.23	86.17	11
16	Stamm 11-11 6107 (Holland)	58.00	109.02	6	59.72	93.18	11
17	Stamm 11-11 6118 (Holland)	60.71	113.85	2	61.00	98.61	7
18	Bijevski 43 (SSSR)	55.59	98.61	19	59.23	80.01	23
19	Nosovskij 2 (SSSR)	59.19	91.90	27	57.20	91.77	15
20	Stepovoy (SSSR)	56.91	67.48	24	58.20	92.17	16
21	Uman'skiy 2021 (SSSR)	53.18	81.16	23	59.91	93.17	10
22	Anton (Nizhny)	43.10	81.08	21	62.86	100.23	1
23	Antik (Poland)	53.13	99.86	17	58.20	97.99	11
24	Arel (France)	56.67	106.12	8	61.04	102.16	3
25	Shovenskij Duna (SSSR)	53.30	100.00	16	61.75	107.00	5
8	Primerne body	53.00	67.68 121.07	1 25	58.15	76.27 106.23	1 25

Key: a - number; b - variety; c - grain; d - \bar{X} in percent; e - rank; f - straw; C - England; h - Holland; i - Denmark; j - Germany; k - Austria; l - USSR; m - Norway; n - Poland; o - France; p - control (Czechoslovakia); S - average value; 18 - Il'yinetskiy; 19 - Nosovitskiy; 20 - Stepovoy; 21 - Uman'skiy.

Experiments in the Training Period (20th Growing Season)

Key: a - number; b - variety; c - grain; d - \bar{X} in percent; e - rank; f - straw; g - England; h - Holland; i - Denmark; j - Germany; k - Austria; l - USSR; m - Norway; n - Poland; o - France; p - control (Czechoslovakia); s - average values; 18 - Il'yinskii; 19 - Korotitskii; 20 - Stepovoy; 21 - Uvanskiy.

Technological Analyses of Spring Barley

(a)	(b)	(c)		(d)		(e)	(f)		(g)
		Weight	Volume	Weight	Volume	Waste	Weight	Volume	Moisture
		kg	hl	kg	hl	kg	kg	kg	%
							(h)	(i)	
1	Pioneer (Anglijskiy) (A)	65.2	38.0	21.2	17.1	36.3			96
2	Hexagon (Anglijskiy)	61.0	37.1	21.5	18.1	32.5			94
3	Delta (Holandskiy) (B)	65.1	72.0	19.5	8.5	45.7			95
4	Granat (Rakuskiy)	67.2	60.5	26.5	19.2	40.2			96
5	Granat-1 (Rakuskiy) (C)	62.0	57.7	21.9	17.7	40.0	2		96
6	Gigant (Danskiy)	67.8	52.0	32.2	15.8	35.2			98
7	Soyuz (Danskiy)	58.2	38.8	20.0	21.6	38.0			95
8	Mentor (Danskiy)	67.0	60.0	27.7	12.0	39.1			100
9	Danub (Danskiy)	60.0	41.0	26.5	12.7	33.0			100
10	Reinas Wina (Nemetskiy) (D)	68.8	60.8	19.8	15.1	48.9			98
11	Polibock (Viroy) (Nemetskiy)	66.2	71.5	15.2	19.0	51.0			96
12	Chowinac-1 (Nemetskiy)	68.8	55.2	20.0	15.8	48.5	2		94
13	Isis (Stamm 1606) (Nem.)	68.0	65.2	20.0	14.5	48.0			96
14	Polar (Nemetskiy)	68.0	76.2	15.8	19.0	52.8			100
15	Andetta-1 (Rakuskiy) (E)	66.2	57.2	22.0	16.8	44.1	2		98
16	Stamm 16-1-6117 (Rakuskiy)	64.0	75.2	15.2	14.6	48.8			100
17	Stamm 16-11-6118 (Rakuskiy)	65.8	75.6	15.2	14.2	50.0			92
18	Igarka-15 (SSSR) (F)	66.6	59.0	26.5	14.5	39.1			100
19	Nosovitskiy-2 (SSSR)	64.0	55.0	14.2	18.8	41.1			96
20	Stepovoy (SSSR)	67.8	60.2	21.8	15.0	46.0	2		94
21	Umanetskiy-201 (SSSR)	63.6	40.0	37.5	22.5	26.1			96
22	Damen (Nizskiy) (G)	68.0	79.0	12.2	8.5	55.7	2		92
23	Antick (Nizskiy) (H)	65.0	56.3	36.2	7.5	28.7			100
24	Arval (Francuskiy) (I)	64.8	60.5	22.2	8.3	42.6			100
25	Slov. Dan. trib. - kontrol (SSSR) (J)	67.8	54.5	28.0	17.5	39.6			92
8	Promeritno hodnoty	65.22	61.67	21.32	15.80	39.08	2		96.86

Key to Table 12: a - number; b - variety; c - hectoliter weight; d - sifting, mesh size; e - waste; f - absolute dry weight; g - cut through endosperm; h - mealy; i - half-steely; j - steely; k - mealy in percent; l - moisture content, percent; m - chemical content of dry matter; n - nitrogen; o - protein; p - starch; q - malt extract; r - yield; s - dry malt; t - dry extract; u - crop; v - dry matter in the grain, per hectare; w - dry extract per hectare; x - dry extract produced per hectare, in percent of the control; y - rank;

A - England; B - Holland; C - Denmark; E - Germany; E - Austria; F - USSR; G - Norway; H - Poland; I - France; J - control (Czechoslovakia); S - average values;

18 - Il'yinetskiy; 19 - Nosovitskiy; 20 - Stepovoy; 21 - Umanetskiy.

(1964 Growing Season)

Table 12

		(z)		(u)		(x)			
		(s)		(t)		(v)		(w)	
(j)	(k)	(a)	(b)	(p)	(c)	(s)	(t)	(v)	(w)
1	65	12.1	12.8	11.3	61.1	76.8	94.9	76.1	80.2
2	67	12.7	12.9	10.1	59.2	76.1	94.9	76.1	80.2
3	68	12.2	12.8	10.4	57	76.6	94.9	76.1	80.2
4	68	12.2	12.8	10.1	59.2	76.1	94.9	76.1	80.2
5	69	12.7	12.8	10.7	57.2	76.7	94.9	76.1	80.2
6	70	12.6	12.8	10.7	58.8	76.6	94.9	76.1	80.2
7	70	12.8	12.9	10.6	56.2	76.2	94.9	76.1	80.2
8	70	12.6	12.2	10.4	56.6	76.7	94.9	76.1	80.2
9	71	12.1	12.6	12.8	58.9	77.3	94.9	76.1	80.2
10	71	12.2	12.7	12.9	59.9	76.7	94.9	76.1	80.2
11	73	12.9	12.7	12.2	59.5	76.9	94.9	76.1	80.2
12	73	12.9	12.8	10.6	61.5	76.2	94.9	76.1	80.2
13	74	12.8	12.6	10.7	61.9	76.2	94.9	76.1	80.2
14	74	12.1	12.1	10.8	60.5	76.5	94.9	76.1	80.2
15	74	12.5	12.5	10.7	58.1	76.7	94.9	76.1	80.2
16	75	12.6	12.6	12.9	60.8	76.5	94.9	76.1	80.2
17	76	12.3	12.7	10.6	57.5	76.2	94.9	76.1	80.2
18	78	12.8	12.6	11.2	59.1	76.3	94.9	76.1	80.2
19	79	12.7	12.9	10.6	57.8	76.9	94.9	76.1	80.2
20	78	12.6	12.9	11.5	57.5	76.2	94.9	76.1	80.2
21	79	12.9	12.1	11.1	59.6	76.6	94.9	76.1	80.2
22	81	12.5	12.6	12.1	60.8	76.1	94.9	76.1	80.2
23	80	12.2	12.8	11.5	59.1	76.7	94.9	76.1	80.2
24	80	12.7	12.2	10.9	61.5	77.9	94.9	76.1	80.2
Total		68.51	12.38	2.20	55.51	59.70	75.60	94.9	578.2
									52.25
									27.22
									68.9-
									1-20

Table 13

Evaluation of Malt Extract in Dry Matter Content of Spring Barley

No. of expts.	Name of variety (b)	1962		1963		1964	
		extract value (c)	%	extract value (c)	%	extract value (c)	%
1	Aufabek (Poland) (qf)	79.5	98.88	77.2	96.60	74.1	92.10
2	Alad (France) (qf)	79.7	99.12	78.4	98.90	75.2	93.10
3	Brems Wisa (Netherlands) (g)			79.2	99.10	77.2	93.10
4	Carlberg 11 (Denmark) (h)			79.0	99.12	77.2	93.10
5	Craven 11 (Netherlands)			78.8	99.10	77.2	93.10
6	Dana (Denmark)			78.8	99.10	77.2	93.10
7	Della (Holland) (g)			78.8	99.10	77.2	93.10
8	Douglas (Norway) (g)			78.8	99.10	77.2	93.10
9	Falket, Union (Netherlands)			78.8	99.10	77.2	93.10
10	Guz. He (Holland) (g)			78.8	99.10	77.2	93.10
11	Hafnia (Denmark) (k)			78.8	99.10	77.2	93.10
12	Hjortskj 43 (SSSR) (k)			78.8	99.10	77.2	93.10
13	Lisa (Stamm 1450) (Netherlands)			78.8	99.10	77.2	93.10
14	Mentor (Denmark)			78.8	99.10	77.2	93.10
15	Norfolk 2 (SSSR)			78.8	99.10	77.2	93.10
16	Plena (Netherlands)			78.8	99.10	77.2	93.10
17	Proctor (Anglo) (l)			78.8	99.10	77.2	93.10
18	Rayston (Anglo) (m)			78.8	99.10	77.2	93.10
19	Sjet (Denmark)			78.8	99.10	77.2	93.10
20	Shovenky 1017 (Belarus) (n)			78.8	99.10	77.2	93.10
21	Stamm 1411 (Belarus) (n)			78.8	99.10	77.2	93.10
22	Stamm 1411 (Belarus) (n)			78.8	99.10	77.2	93.10
23	Stepovoy (SSSR)			78.8	99.10	77.2	93.10
24	Umanish 201 (SSSR)			78.8	99.10	77.2	93.10
25	Violetta 11 (Belarus)			78.8	99.10	77.2	93.10
26	Primerat (Belarus) (o)			78.8	99.10	77.2	93.10

Key: a - number; b - variety; c - malt extract; d - rank; e - Poland; f - France; g - Germany; h - Denmark; i - Holland; j - Norway; k - USSR; l - England; m - control (Czechoslovakia); n - Austria; o - average values; 12 - Il'yinskii; 15 - Krasovitskii; 23 - Stepovoy; 24 - Umanish.

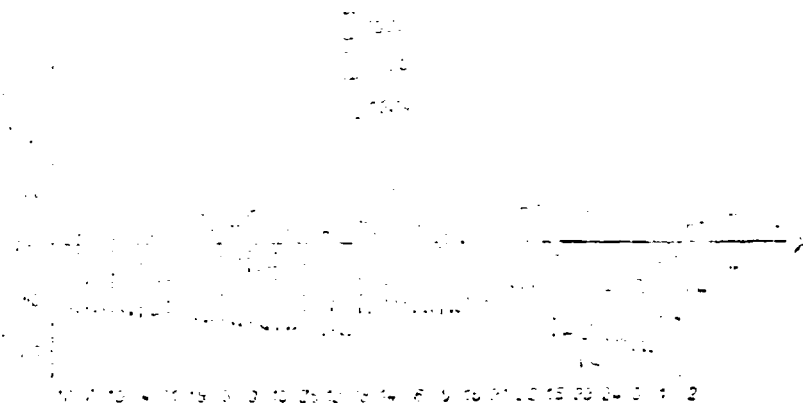


Fig. 3. Grain Yield of Spring Barley in Piestany.

The y-axis shows the grain yield in percent; 100 percent is the grain yield of the control variety. The x-axis shows the varieties: 1 - Antalek; 2 - Ariel; 3 - Browns Wisa; 4 - Carlsberg II; 5 - Chiewener II; 6 - Dana; 7 - Delta; 8 - Doren; 9 - Firlbecks Union; 10 - Gazelle; 11 - Harbin; 12 - Il'yinetskiy; 13 - Lisa; 14 - Mentor; 15 - Nosovitskiy 2; 16 - Plena; 17 - Proctor; 18 - Rayston; 19 - Sejet; 20 - Slovensky Danajsky trh; 21 - Stamm H-II 6117; 22 - Stamm H-II 6118; 23 - Stepover; 24 - Umanskiy; 25 - Violetta II.

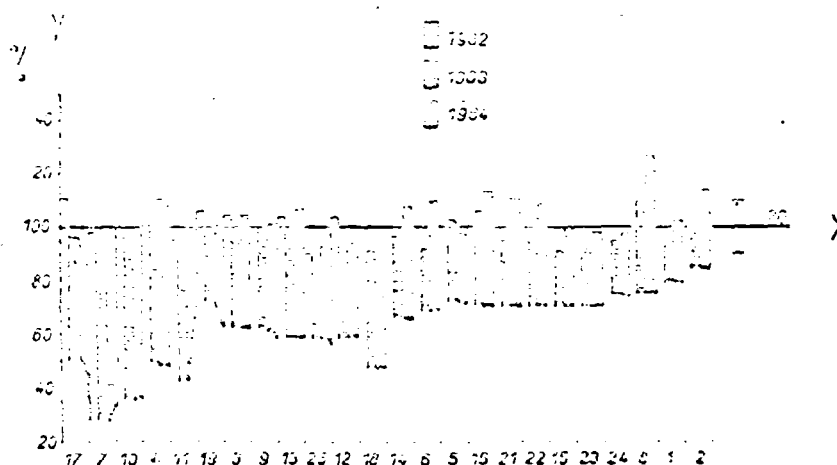


Fig. 4. Straw Yield of Spring Barley in Piestany.

The y-axis shows the straw yield in percent; 100 percent is the straw yield of the control variety. The x-axis shows the varieties [1--25 as in Fig. 3, above].

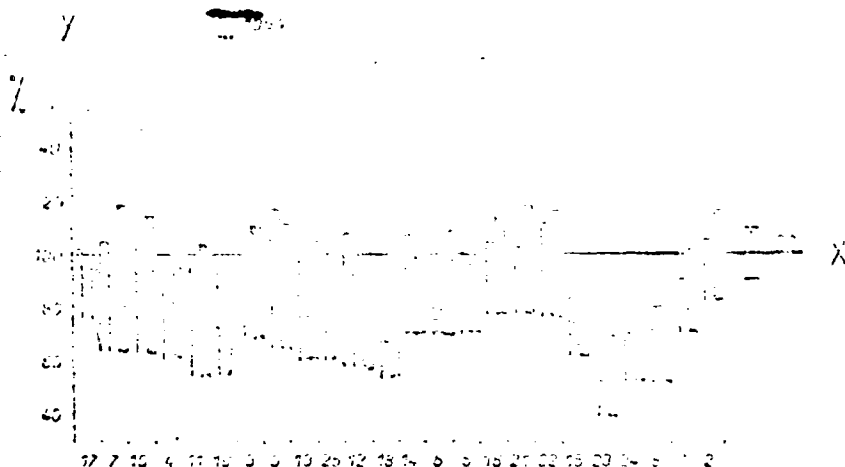


Fig. 5. Malt Yield of Spring Barley in Piestany.

The y-axis shows the malt yield in percent; 100 percent is the malt yield of the control variety. The x-axis shows the varieties: 1 - Antalek; 2 - Ariel; 3 - Breuns Wisa; 4 - Carlsberg II; 5 - Criewener II; 6 - Dana; 7 - Delta; 8 - Domen; 9 - Firlbecks Union; 10 - Gazelle; 11 - Hafnia; 12 - Il'yinetskiy 43; 13 - Lisa; 14 - Mentor; 15 - Nosovitskiy 2; 16 - Plena; 17 - Proctor; 18 - Rayston; 19 - Sejet; 20 - Slovensky Dunajsky trn; 21 - Stamm H-II 6117; 22 - Stamm H-II 6118; 23 - Stepovoy; 24 - Umanskiy 2021; 25 - Violetta II.




Fig. 6. Winter wheat, Bezostaya 1 variety (USSR).

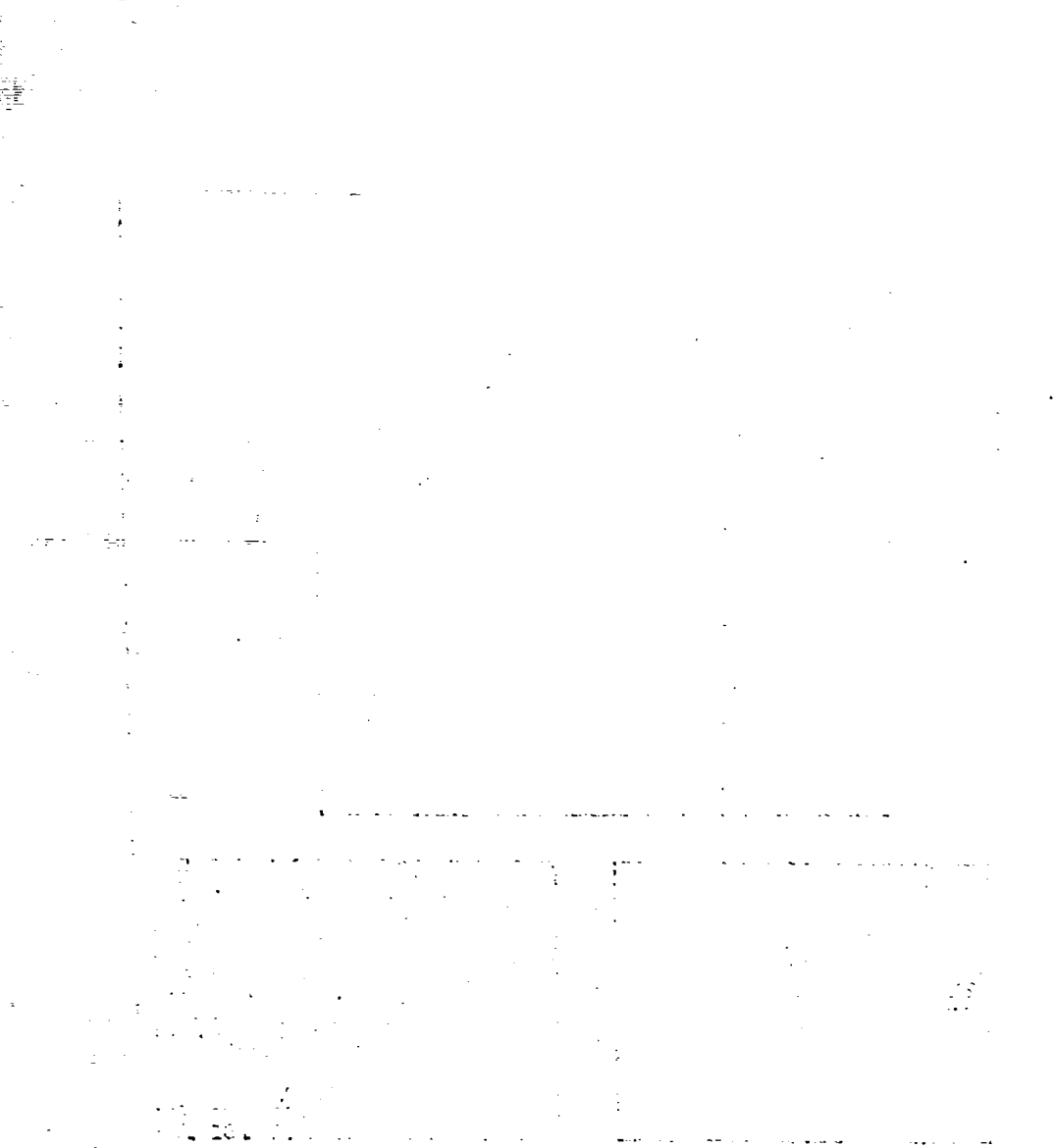


Fig. 7. Winter wheat, Mironovskaya 808 variety (USSR).

Fig. 3. Winter wheat, Fertodi 293 variety (Hungary).

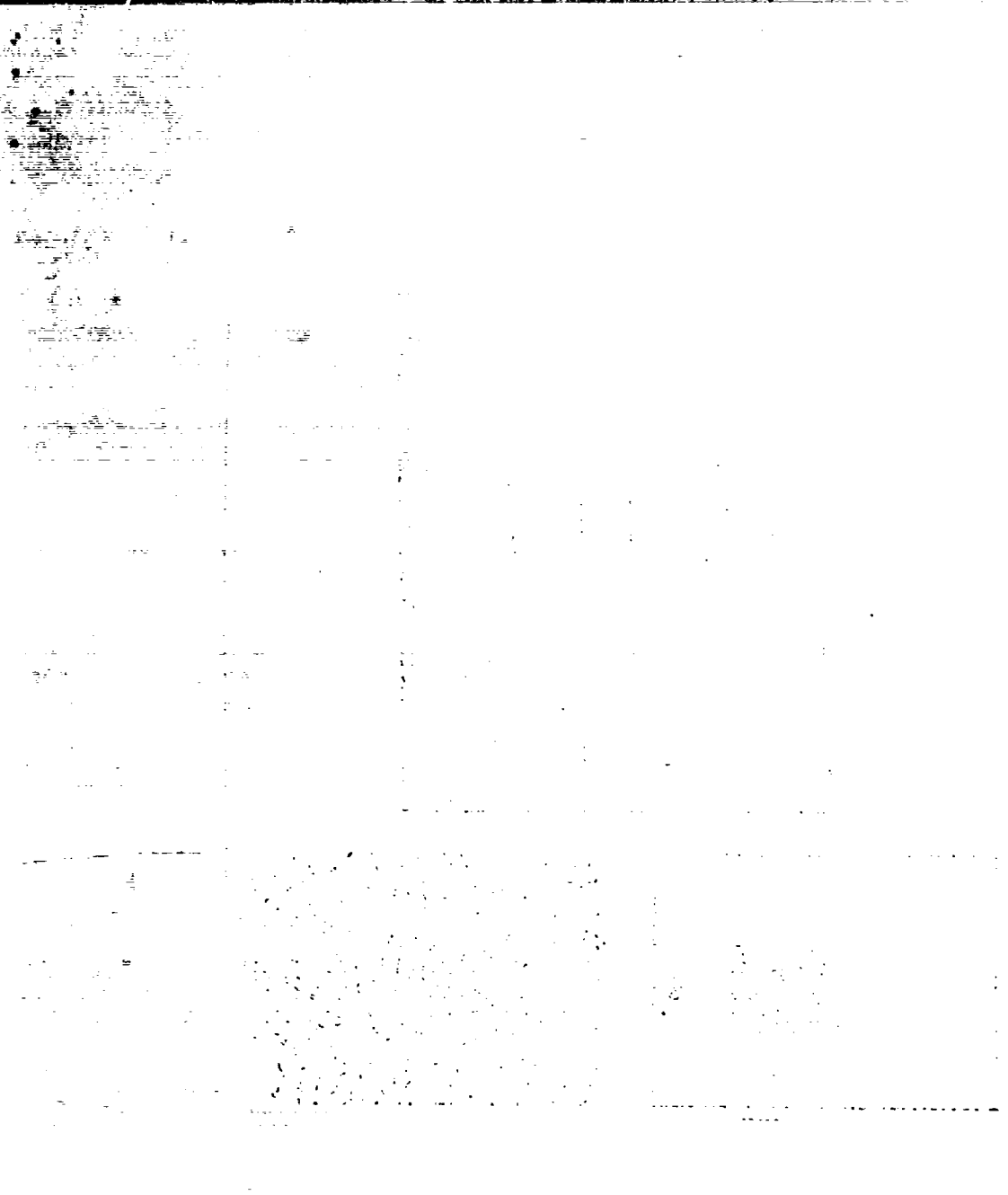


Fig. 9. Spring barley, Mentor variety (Denmark).

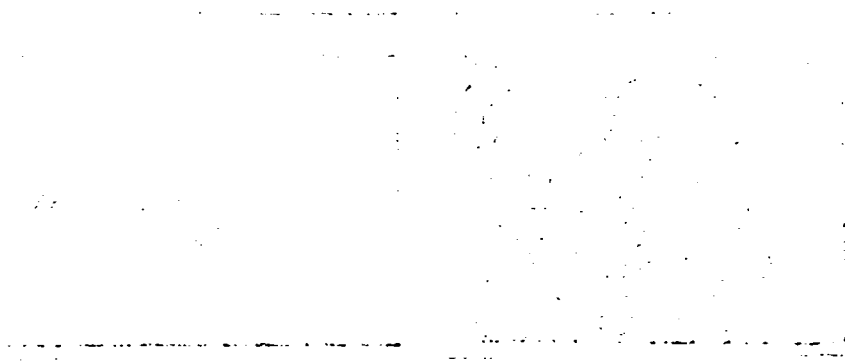


Fig. 10. Spring barley, Plena variety (East Germany).

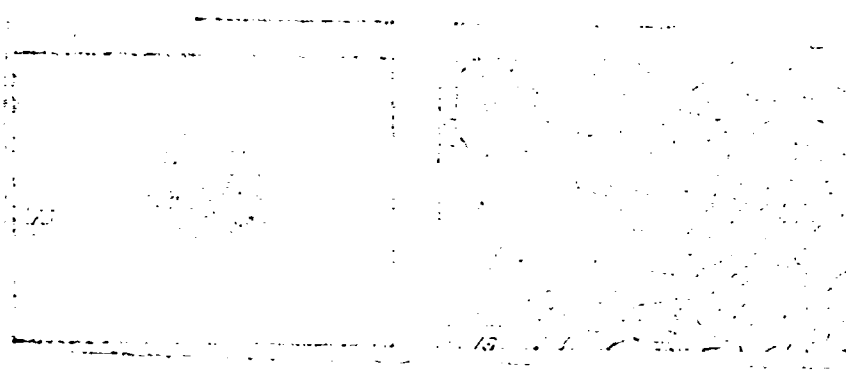


Fig. 11. Spring barley, Stamm H-II 6117 variety (Austria).

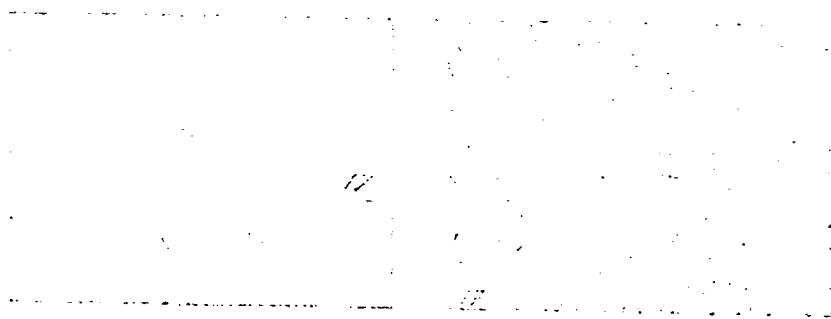


Fig. 12. Spring barley, Stamm H-II 6118 variety (Austria)

Fig. 13. General view of plots in spring of 1962.

Fig. 14. General view of same plots in full growth.

Fig. 15. General view of plots in spring of 1963.

Fig. 16. General view of same plots in full growth in 1963.

The diagram in Fig. 1 shows the attained grain yields. The control variety equals 100.00 percent and coincides with the x-axis. Fig. 2 illustrates the achieved straw yields.

For spring barley the weather in the 1962 growing season was basically favorable. Table 7 presents the results of the yield tests. From an analysis of the variances we obtained the following results. Grain: varietal difference $P = 0.05 = 2.9 \text{ q}$ ($= 4.62$ percent); varietal difference $P = 0.01 = 3.9 \text{ q}$ ($= 6.22$ percent). Straw: varietal difference $P = 0.05 = 9.68 \text{ q}$ ($= 12.75$ percent); varietal difference $P = 0.01 = 13.15 \text{ q}$ ($= 17.32$ percent). From this it is evident that in the tests the grain yields are not significant as compared with the control. In the straw yields there were likewise no significant differences. Table 8 presents the results of the technological and malting analyses of the investigated varieties. The Il'yinetskiy 43, Delta, and Proctor varieties had higher malt yields per hectare.

In the 1963 growing season the weather was initially unfavorable for the development of spring barley. The dry and late spring, and also the seeding caused the uneven emergence and development of the plants, which significantly improved later in the season. Table 9 presents the yield tests for this season. From an analysis of the variances we obtained the following values. Grain: varietal difference $P = 0.05 = 2.53 \text{ q}$ ($= 4.75$ percent); varietal difference $P = 0.01 = 3.36 \text{ q}$ ($= 6.32$ percent). Straw: varietal difference $P = 0.05 = 3.96 \text{ q}$ ($= 6.60$ percent); varietal difference $P = 0.01 = 5.26 \text{ q}$ ($= 8.74$ percent). From the presented data it is evident that the varieties ranking from 1 to 10 are significantly better than the control in terms of the grain yield, and that the varieties ranking first and second are significantly better in terms of the straw yield. In Table 10 we present the results of the technological and malting analyses of the performed tests. The Firlbecks Union, Stamm H-II 6118, Mentor, Ariel, Plena, Gazella, and Stamm H-II 6117 varieties had higher malt yields per hectare than the control variety.

The weather was favorable for spring barley in the 1964 growing season. Table 11 presents the results of the yield tests. From an analysis of the variances we obtained the following values. Grain: varietal difference $P = 0.05 = 3.78 \text{ q}$ ($= 7.34$ percent); varietal difference $P = 0.01 = 5.00 \text{ q}$ ($= 9.71$ percent). Straw: varietal difference $P = 0.05 = 5.36 \text{ q}$ ($= 9.78$ percent); varietal difference $P = 0.01 = 7.10 \text{ q}$ ($= 12.95$ percent). The varieties ranking from first to seventh have significantly higher grain yields than the control, and the varieties ranking from first to sixth have significantly higher straw yields. Table 12 presents the technological and malting analyses of the performed tests. In this case many varieties (up to 15) gave higher malt yields per hectare.

The diagram in Fig. 3 sums up the grain yields during the entire test. Fig. 4 sums up the straw yields; and Fig. 5, the malt yields per hectare. The control variety equals 100.00 percent and corresponds to the x-axis.

One of the most important values and standards for introducing the cultivation of brewer's barley varieties (or for recommending them for special breeding) is the value of the dry malt extract. As evident from Table 13 and the results of the evaluation, the Slovensky Dunajsky trh (SDT) variety, which is zoned for the corn region, maintains its high international level in comparison with the other tested varieties. In 1962 it ranked third and fourth, surpassed only by Germany's Firlbecks Union (100.87 percent) and England's Proctor (100.62 percent) varieties. However, the differences are so slight that practically it is impossible to speak of a lead. In 1963 the SDT variety ranked first. In 1964 it was second, after Denmark's Dana (100.51 percent). Here again we cannot speak of a lead in practical evaluation. On the basis of the dry malt extract values in the spring barley tests conducted in Piestany, we have come to the conclusion that on this basis the tested and evaluated foreign varieties of spring barley are not better in the corn region than the zoned SDT variety.

Discussion

We will evaluate briefly the obtained results. In terms of the grain yield of winter wheat, the best results were achieved by the Mironovskaya 808, Mironovskaya 264, and Chervonaya varieties. A drawback of the last two varieties is their tendency to lodge. The results of Bezostaya 1 fluctuate from year to year. Very favorable results were obtained with the Malgozatka Udycka and Fertodi 293 varieties. The Stamm 6111 and Kasticka ostena varieties gave higher yields than the control. The southern varieties, particularly from Italy, proved unsuitable. In terms of the straw yield, all the varieties were less productive than the control. This is due especially to the fact that all the investigated varieties are basically short-stemmed varieties.

In terms of grain yield, many spring barley varieties exceeded the control. Particularly noteworthy among them is the Mentor variety which basically proved to be the best. Also in this group are the Stamm H-II 6118 and Stamm H-II 6117 varieties, which ranked second, with likewise very favorable results. In terms of straw yield, the investigated varieties did not surpass the control. The only exception was the Doman variety, but its grain yield did not attain the level of the best world varieties. Noteworthy is the Plena variety. Interesting is the evaluation of the malt yield per hectare. In this respect the Stamm H-II 6118, Firlbecks Union, Ariel, Plena, Mentor, and Gazelle varieties deserve mention.

In general the Czechoslovak zoned varieties are good. But it must be admitted that many foreign varieties of winter wheat and spring barley attained the level of our domestic varieties and even surpassed them in certain properties, particularly in terms of yield and technological

characteristics. These varieties should be included in a special breeding program, or their direct use in breeding should be considered.

Summary

Selected varieties of certain grains were evaluated in the 1961-1964 growing seasons, from the viewpoint of their use in the corn region. The world assortment of grains served as the basis for the tests. The actual tests covered 235 grain varieties, including 166 varieties of winter wheat, 96 varieties of spring barley, and 23 varieties of spring wheat. Some interesting results are presented for winter wheat and spring barley. On the basis of the tests we have reached the following conclusions.

1. We recommend the following varieties of winter wheat for inclusion in a special breeding program, or for cultivation: Mironovskaya 808 (USSR) for its grain and straw yields, and for its intrinsic value; Bezostaya 1 (USSR) for its grain yield, technological properties and suitability for mechanized harvesting; and Fertodi 293 (Hungary) for the quantity and quality of its yields.

2. Because of their yields, technological qualities and resistance to lodging, we recommend the following varieties of spring barley for inclusion in a special breeding program or for cultivation: Mentor (Denmark), Stamm H-II 6117 and Stamm H-II 6118 (Austria), and Plena (East Germany).

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